Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

TABLE II.—SHOWING PROPORTION OF AMMONIA AND NITRIC ACID IN SOME RAINS.

LITRES PER ACRE.	PARTS PER MILLION.	
	Ammonia.	*Nitric acid.*
850	14.50	4.84
10,075	4.30	7.04
1,750	12.60	8.33
3,500	9.10	2.56
7,975	9.10	2.71
9,750	4.35	3.30
3,900	6.10	2.82
925	2.85	3.95
28,200	.04	.51
312,730	.07	.31
121,900	.00	.38
112,500	.04	.64
206,250	.19	.38
26,925	.26	.16
10,750	.27	.25
62,250	.69	.13

ADDITIONS TO KANSAS BIRDS.

BY COL. N. S. GOSS, TOPEKA.

Frosted Poor-will, *Phalænoptilus nuttalli nitidus.* A summer resident. Taken at Neosho Falls and Manhattan.

Little Brown Crane, *Grus canadensis.* This bird was omitted by oversight from the catalogues, and subsequent lists as reported to this society. It is not uncommon during migration.

OCTOBER, 1889.

ARTESIAN WELLS IN KANSAS, AND THE CAUSES OF THEIR FLOW.

BY ROBERT HAY, F.G.S.A., JUNCTION CITY.

[*Abstract.*]

This paper mentions twelve localities where there are artesian wells in Kansas. The Larned well has the largest flow—nearly three hundred gallons per minute—and gives out a strong brine. There is a group of wells in Hamilton county, and another group in Meade county, available for irrigation.

The principal feature in the paper is the discussion of the causes of artesian flow. The conditions resulting in the usual form of artesian wells, which are exemplified by those mentioned above, are a porous rock, having an out-crop to catch the rainfall of a region of some extent, and dipping toward the well with a layer of clay, clay-shale, or other impervious material, above and below it, so that the water of the porous stratum is inclosed as in a pipe, and it rises to the surface when the well-driller pierces the upper impervious stratum. The cause of the rising of the water in these conditions is *hydrostatic pressure*, just as it is in the rising of the water to the tops of high buildings in the water service of a city.

A well at Mound Valley, in Labette county, was described as illustrating the rise of water to the surface without the necessary hydrostatic pressure, the column of water being held up by an outflow of natural gas. This the writer termed *gas-pressure*, which in this case is an efficient cause of artesian flow, and which in other cases is probably a help.

Wells in Morton county and in Pottawatomie county were described, having depths of three hundred to nine hundred feet, and having small but constant flow of mineralized water. In these wells the conditions of hydrostatic pressure appear to be absent, and in only one is there any show of gas; and for these and other wells the writer assigned a cause not usually found, for artesian flow. He called it *rock-pressure*, and said: "All rocks in the earth's crust contain some water. The more porous rocks contain the greater quantity. At a distance below the surface, the superincumbent mass subjects the rock masses to enormous pressure. If we assume that the rocks of Kansas to a depth of one thousand feet have an average specific gravity three times as great as that of water, we are probably within bounds, as, though limestones and sandstones are usually somewhat less, the presence of iron in many of the beds will bring up the average considerably. On this basis, a prism of the rocks to the depth of 600 feet and one inch square would weigh 781 pounds, which is equivalent to a pressure of 52 atmospheres. If then 25 feet be taken as the measure of a column of these mineralized waters equivalent to one atmosphere, the rock-pressure would be more than the equivalent of a column of water twice this height.

"Let a water-bearing stratum at a depth of 600 feet be pierced by the drill; we should then have the rock-pressure of 52 atmospheres squeezing the water out of the rock-pores, and, granting sufficient plasticity in the rock, and a sufficient quantity of water, it must rise in the tube, which has only the pressure of one atmosphere upon it. A large bore to the well and a small supply of water would be against its reaching the surface. On the other hand, a bed-rock with mobile molecules at or near saturation, under this enormous pressure, must cause in a narrow tube a flowing well. At 300 feet the rock-pressure would be only half that given above, or 26 atmospheres, and the column of water to be supported would be diminished in proportion. At other depths the same proportions will hold good.

"Here, then, we have a force that may be an aid to an artesian flow, which is mainly due to the usual causes of such flow, and which is a most efficient cause for the constant flow of wells whose depth is great, and whose quantity of water is small. We are inclined to consider rock-pressure as the cause of the flow of the Pottawatomie and Morton county wells — at least till future search shall make it more probable that it is due to the usual causes of artesian wells."

SOME KANSAS MINERAL WATERS.

BY PROF. E. H. S. BAILEY, STATE UNIVERSITY.

Although this is a comparatively new State, its resources have been wonderfully developed within the past ten years. In common with other possible sources of wealth, the mineral waters have received much attention. Some of them flow from springs, while others are obtained from wells both shallow and artesian. In order that a permanent record may be made of the analysis of some of these waters, the author has selected some of the more important ones, that have been examined in the laboratory of the State University, and presents the analyses for publication.

MARION MINERAL WELLS.

These wells, or more properly this well, is situated in the northern part of Marion, about fifty feet from a small creek. The well, which was drilled as a prospect well, is 175 feet deep, and has two pumps; the first takes the water from a depth of 50 feet, at a point just above the rock, and the other takes the water from a point 25 feet above the bottom. Both contain some hydrogen sulphide gas when first drawn. The temperature is 57° F. The waters are utilized, the upper for drinking and the